

# FREQUENCIES VHF, UHF, SHF NEWSLETTER

**NZ** This newsletter is compiled by Kevin Murphy ZL1UJG to promote operational and construction activity on the VHF, UHF and SHF Amateur Radio allocations in New Zealand (and overseas).

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## ISSUE 21, JANUARY 2006

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### VHF Scene January/ February 2006

Please Acknowledge NZART/Break In/VHF Scene if using material in other publications.

#### VHF Scene Jan/Feb 2006

As 2005 draws to a close, it has left us with some ZL-VK DX and New DX records. 2006 promises to be a great year for DX, Records, and increasing activity on all bands.

#### Microwaves.

There were a number of new distances achieved on the Microwave Bands as the following reports show. A new NZ 10 GHz record, on CW between Ted ZL2IP, and Steve ZL1TPH was made on the 16th December, 2005. Ted operated from his home QTH in Inglewood, Taranaki and was using 1 watt to a 1.2m dish while Steve, using 6 watts to a 75 cm dish was in the vicinity of Manganui Bluff, Northland. Both stations operate Prime focus dishes. The distance is just over 396 km. A contact was started on SSB, with 51/ 53 reports exchanged, however QSL details and hence confirmation could not be completed. They decided to go to CW to initiate the contact again, so that reports and confirmation details could be transferred. On his way home, Steve also exchanged carriers from another location, where the path is predominantly over land. A lot of hard work, over many months, and a high number of previous contacts between them on 10 GHz have resulted in this new Record contact.

5760 MHz Distance extended to 485Km (Ralph, ZL2TV)

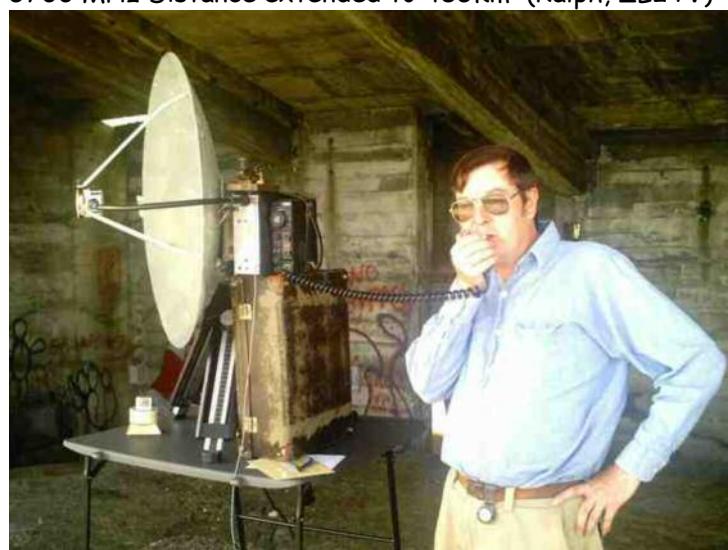


Image of Ralph and the 5760 MHz Equipment  
In the last days of 2005 the plan was activated to bring up the previously worked distance to a margin that was at least greater than that existing for the 3cm band. Steve ZL1TPH and I were now equipped with SSB capable gear and 3 to 5 watts power, up by 10 dB on the 2001 effort. Transverters were used in conjunction with 144 MHz low power IF transceivers, and different frequency offsets to prevent IF breakthrough. Antennas used were parabolic dishes, 60cm and 75cm diameter. Sites were carefully chosen to make all available use of possible forward scatter propagation, although other commitments and

new subdivisions restricted activities on the day to a more marginal path. Our other option would have been to climb some very high and cold mountains, and we have decided to leave that project for teams with expertise in that area. Steve operated the northern end at Muriwai whilst John ZL4JY accompanied me to the southern site, at Makara, where I had first started work as a radio technician at the now abandoned NZPO HF receiving station.

We used a GPS to get the required aiming heading, Steve acquired our carrier as soon as it was radiated and, after a slight delay due to finger trouble with manual Tx/Rx transverter switching, the first contact was established using CW. SSB, although audible, was difficult and it was thought it best to at least complete the contact in CW first.

A lower loss coax was then fitted and after repositioning the equipment to reach the feed the SSB voice contact was established and completed fairly easily. There were quick fades to the signal but it was enough to operate the S meter, 5 x 2 both ways.

John ZL4JY (ex ZL2TRV) also made a separate contact before we disassembled the equipment. A call was then made on 144.2 MHz using a 4 el Yagi as the halo I normally run on the vehicle was not sufficient.

Fine weather prevailed although the Hepburn charts for the day showed no enhancement conditions for the area in NZ.

The distance between stations, pending verification, was 485 Km.

Simon ZL1SWW and Harry ZL1BK have been using the DXR700 equipment (5760 MHz) for mobile to mobile contacts (probably the first in ZL). They mentioned that the signal flutter was really bizarre, and reflections were off many objects.

The scribe (Hamilton) has been experimenting with a 25 km path to Tom ZL1THG (Gordonton). The signals were bounced off the hills near Taupiri and strong signals were received. The scribe was using a N1BWT transverter and PA into a small circular feedhorn, while stationary mobile. Tom is using a DXR700 transverter converted to Xtal Oscillator operation. He has converted the Oscillator multiplier to X5, instead of x3.

## DX.

A report from Nick ZL1IU.

Nick worked Ross VK2DVZ on 2m @ 0749z and 70cm @ 0801z on the 5<sup>th</sup> December. Sigs on 2m were good but not very strong on 70cm. It was the 1st Tropo opening for Nick this season.

Nick, ZL1IU reports that 27<sup>th</sup> December he had a bit of fun on 2m with a nice Sporadic E opening to VK4 & 2. In all he worked 20 stations from as far north as Hervey Bay Queensland, to South of Wollongong in NSW. Some signals were S9++ on 2m, but not a trace on 70cm indicating Sporadic E. Some sigs were around for a few mins, while others just allowed you to exchange calls and reports before they were gone into the noise forever. Nick also worked into Narrabri and Glen Inness well inland in NSW.

Conditions also were good on New Years Eve and New Years Day

Steve, ZL1TPH/p worked VK2AWD, VK2FZ, VK2DVZ, VK2ZT, VK2IF and VK2BA on 144 MHz, while on 1296 MHz worked VK2DVZ.

Nick was also very busy during the opening as this following report shows:-

I had a ball on New Years Eve, with a huge opening which took in VK2, 3, 4 and 7. I worked 13 VK3's and also made it on 70cm with Rob VK3EK. It is not often I get such a good opening into the VK3 area. I was heard in Melbourne but did not contact anyone there. I worked all around Melbourne and past it but not into the city. Rex VK7MO came on and had a huge signal on 2m (S9+40), so we decided to try 70 cm. First Rex had to reassemble his station, and then had to rebuild the 70cm Yagi that he used on his recent trip to VK9 Christmas Island. A picture of 70cm and 2m antennas he used, during his VK9 expedition are in the Dec 2005 RSGB Radcom magazine. It took Rex almost an hour to get sorted and when he did, his signal was S9+ on 70cm. He had the yagi mounted on the deck of his house for this contact. This will be a new distance record on 70cm between ZL\VK and VK7 (Distance ~ 2431 km). We then decided to try 23cm (1296 MHz). Rex had to dismantle the 70 cm station to get going on 1296 MHz. This took some 30 mins, so while he did that I went to the garage and rounded up a feedline and pole to mount my 1296 MHz antenna on. I had to tape my loop yagi to a pole and sit the radio and transverter on the windowsill while I stood on the painting trestles outside the shack window trying to point the antenna in the direction of VK7. Lucky this was around 2am local time in the morning, as I wonder what anyone would of thought had they seen me. We heard each other at first, peaking S2 but no contact resulted. In hindsight, if we had of been a bit earlier we may have made it as signals on 2m were starting to drop between us

VK7MO runs 4 x 10 element Yagis and 400 watts on 2m, and a 35 element Yagi and 180 watts on 70 cm and masthead preamps.

From across the Tasman, Rod VK4KZR is building a number of high performance transverters for improving his station. For 2m and 70cm he has constructed DEM 144-28HP and 432-28HP transverters. These transverters used with a high grade HF.transceiver will provide performance that greatly exceeds that of

VHF/UHF and HF/UHF transceivers. These transverters (and similar ones from DB6NT) are certainly a step above older transverter designs.

### Digital Modes/ Meteor Scatter

Bob, ZL3TY reports on his activities for 2005

2005 was very fruitful on VHF thanks to the WSJT digital modes by K1JT.

At the Technology Conference in Wellington at Easter there was interest expressed in the digital modes so I initiated regular 2m skeds on weekend mornings to give people a chance to try, in particular using the meteor scatter mode FSK441. First success was in early May with QSOs to Auckland with David ZL1BT and Scott ZL1KB, followed soon after by JT65b QSOs with Chris ZL2DX in Martinborough. During the year I had contacts with Bob ZL1RS in Thames, Peter ZL4LV in Dunedin, ZL1RS again, (at the QTH of Nick ZL1IU), Christchurch stations, Starr ZL3CU and Rod ZL3NW. Bob ZL1RS again, from near Palmerston North, then FSK441 QSOs with Brian ZL4AD in Oamaru, and a JT65b contact with Julian ZL2FNF at Waikanae. Most consistent contact for me has been David ZL1BT who has been on most weekends - Thanks David.

At the conference I suggested that it should be possible for me to contact stations anywhere in ZL, at almost any time, if they ran similar equipment to mine (ie a 4 yagi array and 500W). Our weekly skeds confirmed the power of the WSJT digital modes with contacts being made all around ZL, far more would have resulted if more stations were active. For me the meteor scatter mode FSK441 was successful at longer distances and JT65b was better at shorter distances, eg around 350km. Stations with a single yagi and 100W can successfully use these modes and we hope others will have a go in the coming year, particularly more North Islanders needed. One of the really fun aspects is that you can do well even when there is no enhanced propagation.

November and December have brought the usual sporadic E propagation to VK, with regular openings to VK1, 2, 3, 4, 5 and 7 on 6m. On 2m conditions have been poor with only one opening on 30 December with two CW contacts into VK2.

### Propagation

Bob ZL3NE/1 reports on December's activity

This year 6m has been extremely good and it looks like being the best year for many years. I mentioned about last October that the El-Nino weather pattern would be prevailing and it has been, with propagation prominent in and to the North of us.

There have been several days of particular interest like the cold front on Xmas day which brought ZL3, VK's 2, 3, 4, and FK8 as the front came up the Tasman Sea, from the East of Tasmania. On Boxing Day, a second front following the first one (some 18 hours behind it) stopped over the lower North Island to give a big opening from ZL1 to the South Island.

Dec 27<sup>th</sup> brought a big anticyclone into the Tasman Sea covering most of ZL and the East coast of VK. This brought a lot of VK's on 6m and also a 2 meter opening to ZL1.

We had consistent openings between Xmas and New Year, on 6 meters here. Jan 1<sup>st</sup> brought another big anticyclone in the North Tasman and again another big opening with VK's on 2 meters, VK2DVZ being S9 here for 2 - 3 hours.

The lack of 2 meter openings in the southern areas was due to the temperatures being too low for propagation to take place with the cool southerly winds traveling around the southern sector of the anticyclone.

It looks like I will have over 100 contacts with VK on 6 meters and at present I have had 4 contacts with VK on 2 meters. Contact was also made with VK6SN on CW during 7<sup>th</sup> January

### EME

EME activities have continued throughout the year, 2m being the main activity, my total of new stations worked reached 240 by year's end with 49 DXCC countries in the log. Most of the contacts were with JT65b mode, only a handful using cw. (Bob ZL3TY)

### 6m

Each summer the 6m DX brings new stations on trying for a few DX QSOs. It is timely to remind everyone that you must have a permit to operate between 50 and 51MHz. This is because of the presence of Channel 1 TV transmitters and the potential for hams to QRM TV. It is important to observe this restriction

because our access to the low end of 6m was achieved after a long effort by many people and we don't want careless people jeopardising the limited access we do have. So please, if you want to try 6m operation between 50 and 51MHz, check with your local Radio Inspectors for a permit.  
(Bob ZL3TY)

## Contests

VHF Field day on the first weekend of November was an interesting event. Congratulations to the team (shown in the image below L to R) at Moirs Hill, comprising of Simon ZL1SWW (Chief Op) and Steve (ZL1TPH). They won by a significant margin, having a station on each band from 6m (51 MHz) to 6mm (47 GHz) and were kept very busy.



There was a significant opening on 6m during the contest and many stations were rewarded with good DX to VK.

Many long distance contacts were made on 2m and 70cm, while there was a significant increase in activity on the bands 1296 MHz and up. There was a large amount of activity especially on 5760 MHz due to the availability of the DXR700 transverters. The (almost permanent) link on 10368 MHz from Moirs Hill, Warkworth to Inglewood, Taranaki held up for the duration of the contest and gave the ZL1SWW and ZL2IP stations the edge during the contest.

The scribe is sure that there many paths throughout NZ that give good signals on the Microwave bands over several hundred km.

The VHF Field Day report compiled by Leon ZL2AOC is in this issue of Break In. Leon has retired from the position of VHF-UHF Contest Manager and I thank him for the considerable work he has done over the time he has held the position. Doug, ZL2TAR has filled the position in the interim, and there will be a review of VHF/UHF contests during the early part of this year.

## Next VHF Contest

The 2006 HIBERNATION CONTEST will be held in early April.

Saturday 1st April 2006. Six one-hour periods: 1700 to 2300 NZT.

Sunday 2nd April 2006. Six one-hour periods: 0700 to 1300 NZT.

## Satellites

Murray ZL3MH has been active on the Satellites again. During the first few days of January, Murray was on AO51, I was using FDK Multi 2000 on 2m with 10 watts output to 11 element beam. On 70cms receive, a 20 element Yagi feeds a 435 MHz Cavity Filter then into MRF901 pre-amp and a Uniden X-760 scanner. Stations worked were VK6AKI Ron, VK2WEL George, VK4JWT John VK2TJU Judy, VK4ZQ Roy and VK2TXT Paul.

Thanks to Tim VK2XTT, I also worked the ISS (International Space Station) during the first few days of January, while it was in repeater mode. The Input frequency is 437.800 MHz and Output frequency is 145.800 MHz

One problem is I don't have any FM gear on 70cms but I do have Varactor Tripler. So It's my old FDK Multi 2000, set to 145.933.3 MHz . With 10w into the Varactor it produces 3w output at 70cms. The 3 watts is then driven into a 12 watt PA. Remembering the FM deviation is three times that it is on 2m, I just talk well away from the microphone. On 2m I use my scanner Uniden X-760. I set the Scanner to 145.795, 145.800 and 145.805 so I could cope with doppler. shift

First go I worked ZL1AOX Ian.

Second go on ISS worked VK7AN Alan, VK7JG John, VK3SSB Alf, ZL4AH Ernie, and ZL4KC Ken.

Third go I worked VK3KZZ Mark, VK7AN Alan, VK3SSB Alf, ZL4GFG missed name, and heard ZL2FT.

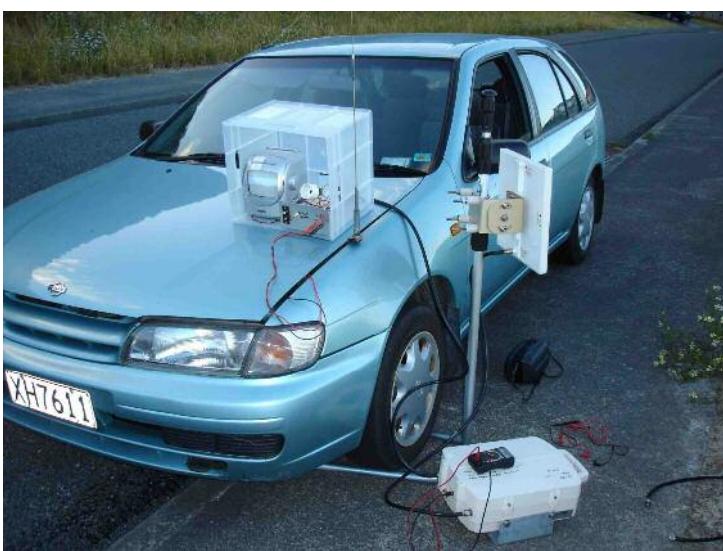
Fourth go ZL2TIA Steve, VK2XTT Tim and heard ZL4AH Ernie and ZL3GR Noel .

Fifth pass VK3DNC Noel and ZL4GL Neil

SuitSat is tentatively planned to be launched from ISS on an EVA on 2<sup>nd</sup> February, 2006. This will have SSTV and messages on 145.990 MHz

## ATV

Tim ZL2RST and John ZL2HD have built and tested a 5.6 GHZ ATV system, and have tested it over 15Km path.



The units are converted DXR 700 out outdoor units, with the digital part replaces by an "ATV IF". Video is modulated to channel 1, mixed to match the 140 Mhz IF of the DXR 700, and put on the IF cable to the ODU. The 70Mhz down from the ODU is demodulated on a Dick Smith black and white TV that was on special over Xmas for \$24!

The ODU is changed from -48v to 12V, and is hardwired for power settings that are normally software controlled. The first problem we found using full duplex is the audio feedback- one end of the link needs an earphone, as the TV is mounted next to the camera mic in the IF box! The link is being readied for the 2006 VHF/UHF contest season.

Picture: the DXR 700 ODU is on the ground, and the IF box is on the bonnet. A surplus panel antenna is being used for the test. Shown is the ZL2HD end of link.

Lots of good information this issue. A thank you to those stations, mentioned in the column and look forward to seeing reports from other stations during 2006.

Information may be sent to Kevin at [rfman@xtra.co.nz](mailto:rfman@xtra.co.nz)

## END of VHF SCENE

### NZART Records Update

### John ZL2TWS

During 2005 the following 8 new records have been listed:

Band	Frequency	Type	Stations	Date	Mode	(KMs)	Prop. Mode
6M	50MHz	EME	ZL3NW-MOBCG	24/01/2005	JT65A	19001	(F2)
2M	144MHz	Int.	ZL1IU-ZL4LV	28/10/2005	FSK441	1214	(MS)
2M	144MHz	EME	ZL3TY-EA5ZF	19/06/2005	JT65B	19242	
70cm	432MHz	O/seas	ZL1IU-VK7MO	31/12/2005	SSB	2432	(TD)
5cm	5760MHz	Int.	ZL2TV/P-ZL1TPH/P	28/12/2005	SSB/CW	485	(TS)
3cm	10368MHz	Int.	ZL1TPH/p-ZL2IP	16/12/2005	SSB/CW	396	(TD)
1.2cm	24000MHz	Int.	ZL1TPH/p-ZL1AVZ/p	27/08/2005	SSB/CW	146	(TD)
0.6cm	47000MHz	Int.	ZL1TPH/p-ZL1AVZ/p	01/05/2005	SSB	47	(LO)

### Note:

2005 had the highest number of claims submitted since I started to keep the records.

This is attributed to several reasons:

- Technological advances in digital communication.
- Affordable higher power microwave equipment.
- Changes in the VHF/UHF/SHF records rules that encouraged new modes of transmission and propagation. These rules were first introduced in December 2004.

<http://www.nzart.org.nz/nzart/vhf/index.html>

**Results of 2005 VHF Field day- 3<sup>rd</sup> and 4<sup>th</sup> December, 2005**

Band	Station	Points	Location	Band	Station	Points	Location
6m (51 MHz)	ZL1BQ	805	Manganui Bluff	6 cm (5760 MHz)	ZL1SWW	2277	Moirs Hill
	ZL1SWW	307	Moirs Hill		ZL2ALW	1663	Mt Ranganui
	ZL2AS	301	Tarapouini Summit		ZL1AOX	1215	Papakura
	ZL1UJG	14	Mt Kioriori		ZL1UJG	952	Mt Kioriori
2m (144 MHz)	ZL1BQ	979	Manganui Bluff	3 cm (10368 MHz)	ZL1SWW	5580	Moirs Hill
	ZL1SWW	590	Moirs Hill		ZL2IP	4650	Inglewood
	ZL2AS	440	Tarapouini Summit				
	ZL2IP	344	Inglewood	12mm (24 GHz)	ZL1SWW	162	Moirs Hill
	ZL1AOX	266	Papakura				
	ZL2MA	115	Maxwell	6mm (47 GHz)	ZL1SWW	81	Moirs Hill
	ZL1UJG	82	Mt Kioriori				
70 cm (432 MHz)	ZL1BQ	1770	Manganui Bluff		ZL1BQ	5218	Manganui Bluff
	ZL1SWW	1105	Moirs Hill		ZL1AOX	3930	Papakura
	ZL2IP	949	Inglewood		ZL1UJG	2904	Mt Kioriori
	ZL1AOX	771	Papakura		ZL2ALW	1663	Mt Ranganui
	ZL2AS	336	Tarapouini Summit		ZL2AS	1077	Tarapouini Summit
	ZL1UJG	82	Mt Kioriori		ZL2MA	115	Maxwell
					ZL2JL	44	South Taranaki
33cm (925 MHz)	ZL1BQ	288	Manganui Bluff				
	ZL1SWW	288	Moirs Hill	Greatest DX			Distance (km)
				6 m	VK5UBC	ZL1BQ	3151
23 cm (1296 MHz)	ZL1SWW	968	Moirs Hill	2 m	ZL2AS	ZL1BQ	471
	ZL1BQ	636	Manganui Bluff	70 cm	ZL1BK	ZL1BQ	395
	ZL1AOX	585	Papakura	33 cm	ZL1SWW	ZL1BQ	125
	ZL2IP	204	Inglewood	23 cm	ZL1BK	ZL1BQ	395
	ZL2ALW	180	Mt Ranganui	12 cm	ZL1SWW	ZL1UJG	155
	ZL1UJG	96	Mt Kioriori	9 cm	ZL1SWW	ZL1AOX	81
				6 cm	ZL1SWW	ZL1UJG	155
12 cm (2424 MHz)	ZL1SWW	2642	Moirs Hill	3 cm	ZL1SWW	ZL2IP	310
	ZL1UJG	1526	Mt Kioriori	12 mm	ZL1SWW	ZL1AVZ	45
	ZL1AOX	1094	Papakura	6 mm	ZL1SWW	ZL1AVZ	45
	ZL1BQ	740	Manganui Bluff				
	ZL2IP	567	Inglewood				
9 cm (3399 MHz)	ZL1AOX	1215	Papakura				
	ZL1SWW	960	Moirs Hill				

Active Stations (71)							
VK2APG	VK2KEV	ZL1ACM	ZL1HN	ZL1SWW	ZL2AS	ZL2IMM	ZL2TPY
VK2ARA	VK2ON	ZL1AKW	ZL1IB	ZL1TWR	ZL2AUB	ZL2IP	ZL2TRN
VK2BHO	VK2TG	ZL1AOX	ZL1KM	ZL1UIJ	ZL2BCK	ZL2KG	ZL2UCE
VK2BJ	VK2YO	ZL1BK	ZL1KO	ZL1UJG	ZL2BWL	ZL2LE	ZL2VM
VK2BX	VK2ZMT	ZL1BQ	ZL1MO	ZL1UTR	ZL2CS	ZL2NF	ZL3TT
VK2BXT	VK4CZ	ZL1BYZ	ZL1NM	ZL1UYJ	ZL2DW	ZL2RC	ZL3UDR
VK2BZE	VK4ID	ZL1CAX	ZL1QF	ZL2AAA	ZL2FT	ZL2TAL	
VK2EDB	VK4ZQ	ZL1DK	ZL1RI	ZL2AGD	ZL2GAZ	ZL2TC	
VK2FAD	VK5UBC	ZL1GSM	ZL1RP	ZL2ALW	ZL2GTB	ZL2TM	

**CONGRATULATIONS TO STEVE ZL1TPH AND SIMON ZL1SWW ON MAKING THE FRONT COVER OF BREAK IN GENERAL**

**10 GHz into Hamilton**

**Kevin ZL1UJG**

Tom ZL1THG has been building a G3WDG 10368 MHz transverter. The Rx side is operational. I borrowed the unit and performed Noise Figure checks at home. It was a presentable 3.7 dB. During a phone conversation with Steve ZL1TPH, he mentioned he wanted to try the path from Moirs Hill to Hamilton. I quickly threw together a feed (N to waveguide adapter) and cable-tied everything to a 60cm dish as can be seen below. (The dish is ex-2.4 GHz from some years back). (The feed definitely wasn't optimum and the feed was only set in the region of the focalpoint.



During Saturday morning Steve TXed while I was in the driveway at home, in Hamilton. I thought I heard something but wasn't too sure. Less than a stones throw away from the house (Really!) is a slightly more elevated site with views of the hills to the north. I removed the dish from the tripod and set up on the grass verge a short distance away. I found Steve's 5 watt carrier straight away, although there was some drift and his carrier was heard from 51 to 53. I also copied Steve on SSB. As I held and panned the dish by hand his signal peaked sharply. There was a slight skew in polarisation probably due to my Heath-Robinson setup.

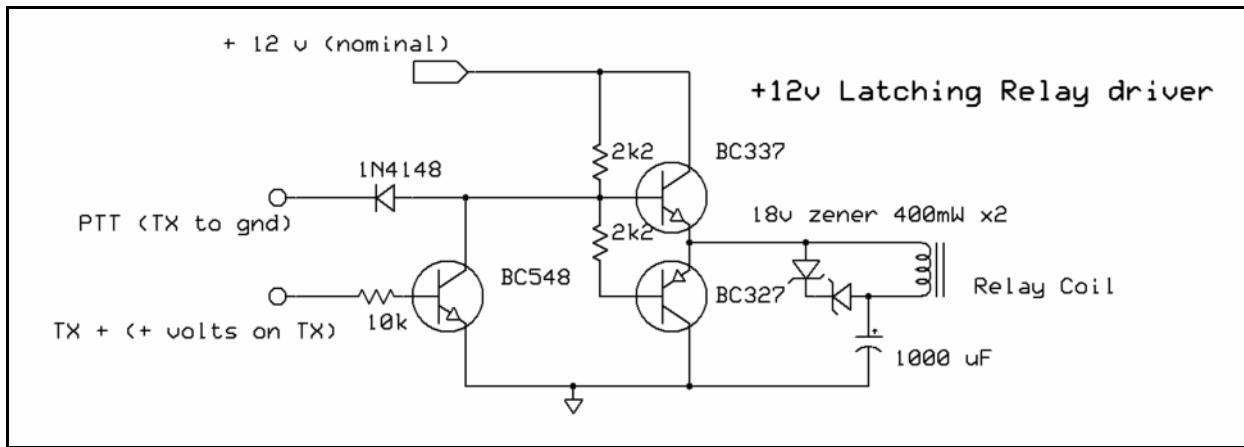
Steve experimented with beam heading his end, but signals peaked towards the Auckland City's favorite landmark. Sky tower The path north is a scatter path, and with the setup here far from optimum, good signals were received over 150 km +.

I am looking at setting the dish up permanently at ~ 20 feet, which should see the hills and look forward to hearing (and working) Steve.

With the high interest on 5 GHz, the availability of equipment by DEM, DB6NT and the Wellington VHF group (?) on 10 GHz, it is certainly another band that is starting to show its potential in NZ. (as can be seen by the numerous contacts between ZL2IP, ZL1TPH and ZL1AVZ). In England it is quite common for the signals on 10 GHz to be stronger than 2m talkback. See you on 10 GHz...

#### +12v Latching Relay driver

The schematic below is of a suitable driver for the HP8761A relays in those Milcom units that were available a few years back. This is a modified circuit from Page 4-6 from the ARRL UHF/Microwaves Project Manual. This circuit may be driven off either a PTT control or TX+ control. If using a high power Amp use a sequencer to delay PA switch on.



#### Interesting Links

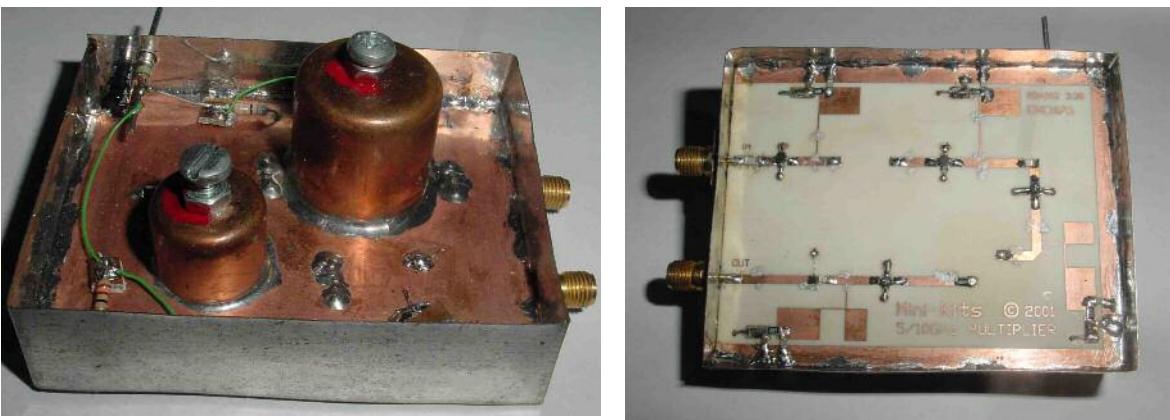
[www.wa5vjb.com](http://www.wa5vjb.com) PCB antennas

[www.scrbg.org/g4jnt/LCKDLOS.HTM](http://www.scrbg.org/g4jnt/LCKDLOS.HTM) Locking Transverter Oscillators

<http://mysite.verizon.net/n1jez/osc/page5.html> GPS Stabilized 10 MHz Oscillator

<http://www.g3pho.free-online.co.uk/microwaves/index.htm> Excellent microwave site

## Minikits EME107 Multiplier ( for 5 or 10 GHz)



Minikits ([www.minikits.com.au](http://www.minikits.com.au)) produce a multiplier kit on Rogers R4003 pcb. The devices are Minicircuit ERA type MMICs. The image is of an earlier model (EME107A). I had obtained the PCB only. Mark now produces the EME107B, which has plated through holes. In my unit I used veropins as grounding points for the MMICs. (4 per device). The unit can be ordered for either 5 GHz output or 10 GHz output. The 5 GHz version has 2 large pipecaps while the 10 GHz version is as shown above.

Suitable applications could be used a local oscillator for either 5760 or 10368 MHz equipment. Alternatively it could be used as a beacon. Pins are used as probes into the pipecap cavities, and I felt that the responses shown on the website indicated that the probes were long. This is probably so that FMATV could be used, without FM/AM conversion happening due to the filter Q. If using these for LO/ Beacon use it is recommended that the probes be shortened to 4.3 mm rather than 6.5 mm.

I aligned the unit and measured low output power and some silver paint was added, as shown to recover gain. Note I also had to silver paint my N1BWT 5760 MHz transverter (not a PTH PCB), which uses similar MMIC devices,

I found that the optimum drive was +7 dBm (5mW) in for about + 7 dBm (5mW) out. The input frequency was 1296 MHz in for 10368 MHz out.

Unwanted harmonics are well rejected. Signal source could be a EME65 Oscillator PCB and a X2 multiplier. I used a homemade multiplier using a BFR92 or BFR93 driving a 3 section stripline filter (on a Waikato VHF Group filter PCB). However a MMIC could be used as a alternative multiplier device.

I would recommend the EME107B for those wishing to put signals on either band.

**Frequency counter** I recently purchased this little counter for my toolkit. It's a handheld counter / level indicator. (It really fits in the palm of your hand !)

It is a 10 Hz to 2.6 GHz counter which uses a NDK TCXO. The antenna connector is a male SMA. Comes with Lithium batteries, charger, plug adapter, antenna, and info.



There are two frequency ranges 10 Hz to 50 MHz and 1 to 2600 MHz. Resolution (adjustable) is 1 Hz/ 10 Hz on 50 MHz/ 2600 MHz.

The unit is specified at 1 ppm. It was ~ 0.5ppm when received and I was able to adjust it to ~ 0.1 ppm.

Sensitivity is good over the HF range, however the sensitivity falls on the higher range as my measurements show.

The level indicator, using a bargraph display has ~ 30 dB range

Available from [www.featuretech.co.nz](http://www.featuretech.co.nz)..

Frequency (MHz)	Level	Equiv dBm
100	3 mV	-37
400	3 - 4 mV	~-37
1000	10 mV	-27
1300	30 mV	-17
1800	48 mV	-13
2000	70 mV	-10
2600	200 mV	0

Please note. I have no association with the company.